

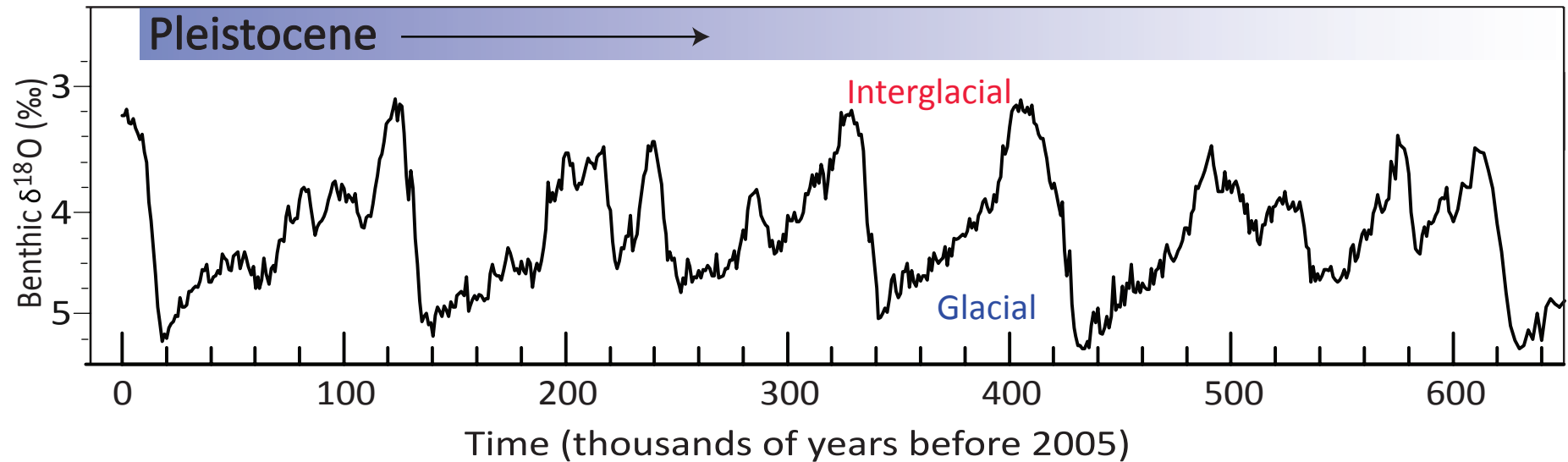
Fossils from Northern California Reveal Mammalian Response to Climatic Change

Jessica Blois & Elizabeth Hadly
Stanford University

5th Annual California Climate Change Conference
10 September 2008



Pleistocene Glaciations



Biotic Responses to Climate Change

Biotic Responses to Climate Change

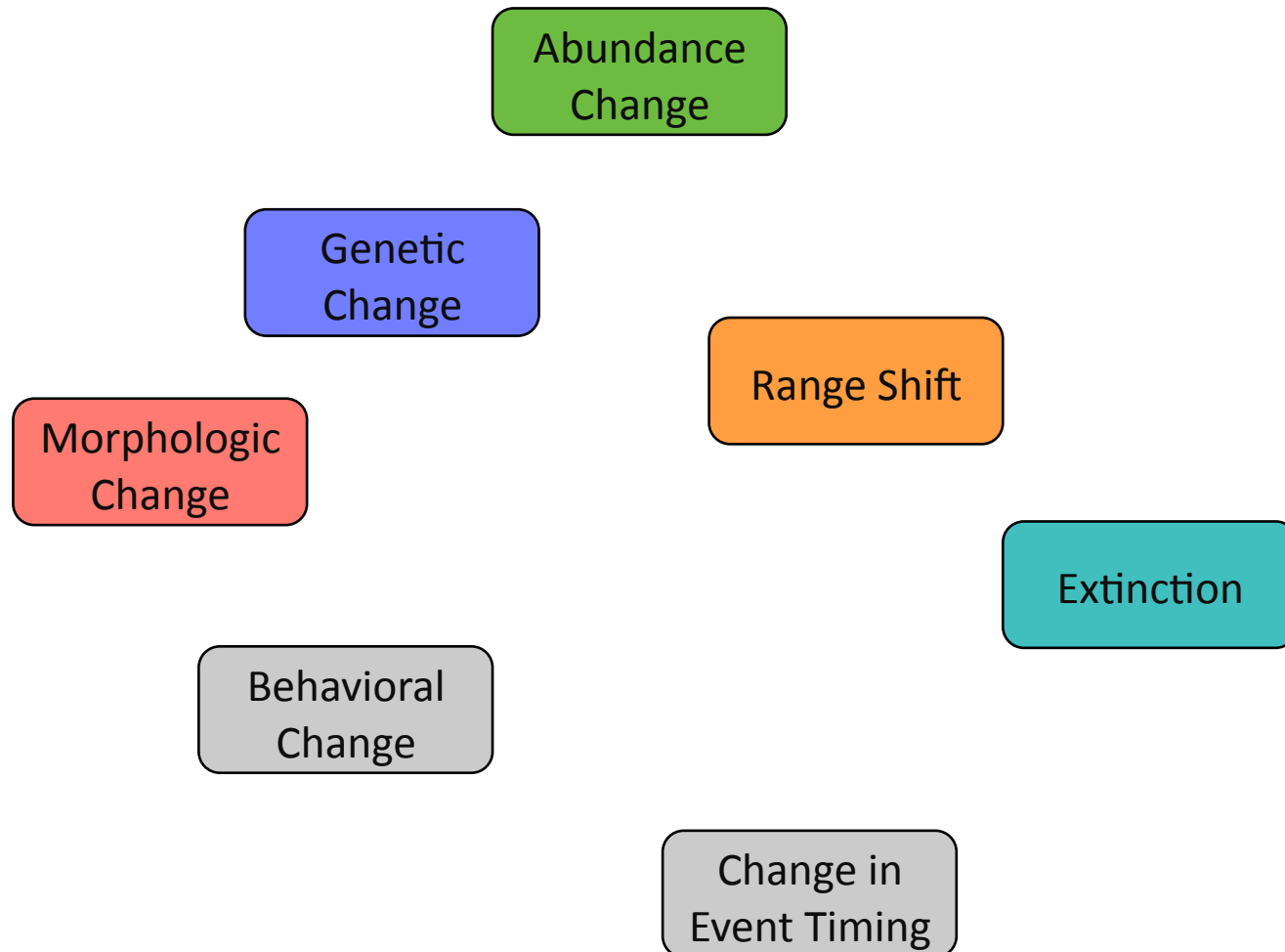


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graph TD; A[Range Shift] --> B[Extinction]
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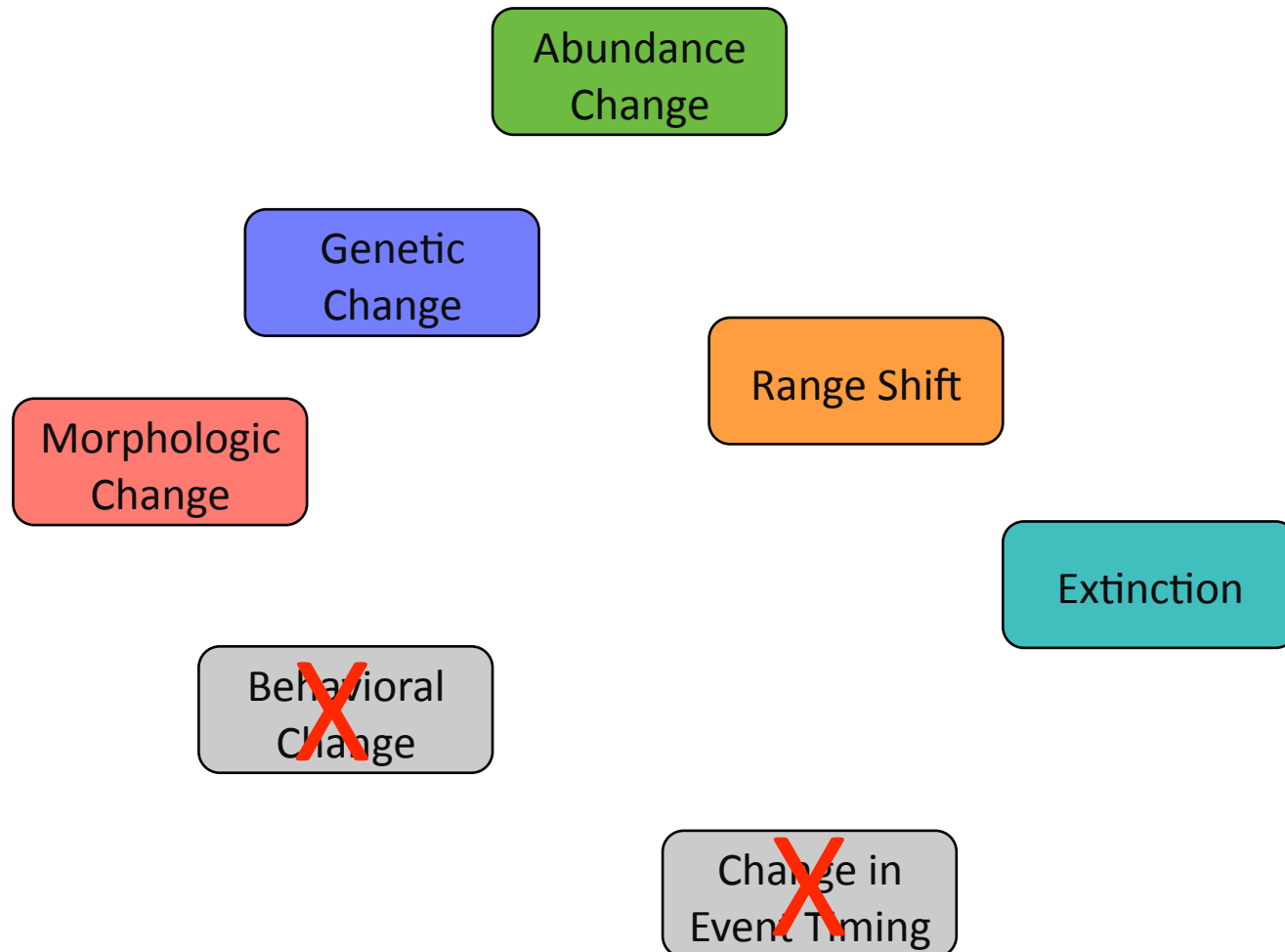
Range Shift

Extinction

Biotic Responses to Climate Change



Biotic Responses to Climate Change



Biotic Responses to Climate Change

Biotic Responses to Climate Change

Abundance
Change



Small mammal community

Biotic Responses to Climate Change

Abundance
Change



Small mammal community

Range Shift



Mountain beaver

Biotic Responses to Climate Change

Abundance
Change



Small mammal community

Range Shift



Mountain beaver

Morphologic
Change



California ground squirrels

Biotic Responses to Climate Change

Abundance
Change



Small mammal community

Range Shift



Mountain beaver

Morphologic
Change



California ground squirrels

Local
Extinction



Pocket gophers

Samwel and Potter Creek Caves



Samwel and Potter Creek Caves



Samwel Cave

Samwel Cave

0-21000 years old
~800 mammal bones

Potter Creek Cave

12-26,000 years old
~4000 mammal bones

Samwel and Potter Creek Caves



Samwel Cave

Samwel Cave

0-21000 years old
~800 mammal bones +
~1600 mammal bones

Potter Creek Cave

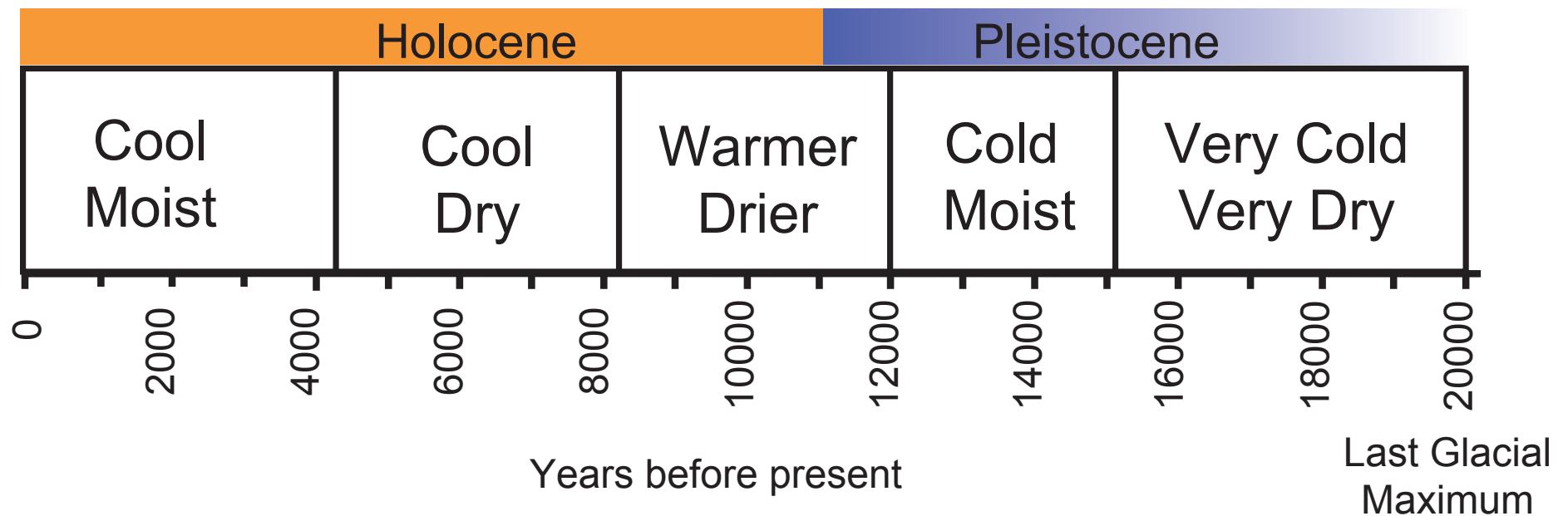
12-26,000 years old
~4000 mammal bones

Pleistocene Glaciations

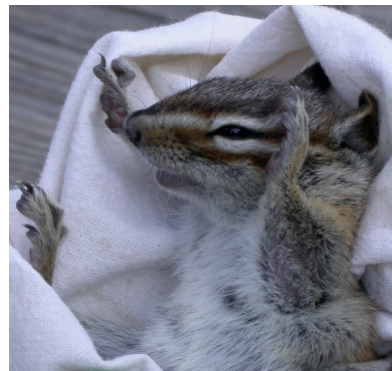
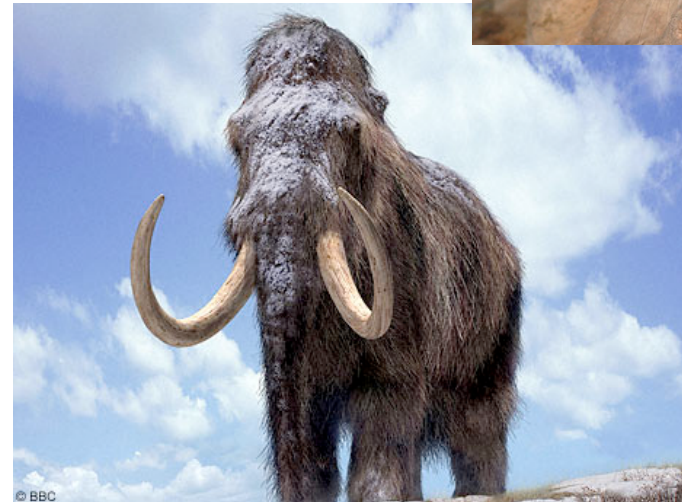


Image by Ron Blakey: <http://jan.ucc.nau.edu/~rcb7/nam.html>

Pleistocene-Holocene Transition



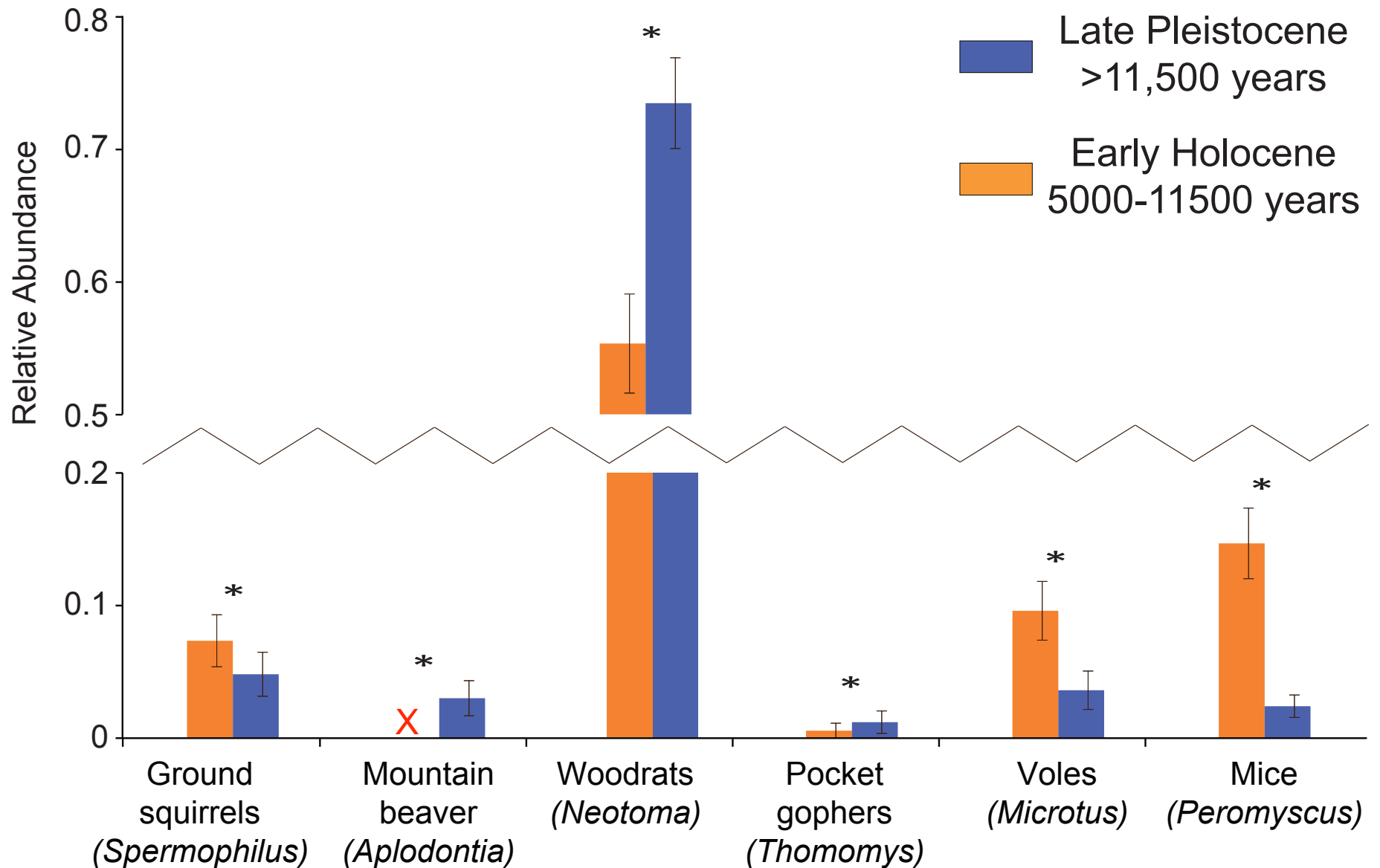
Mammalian Community



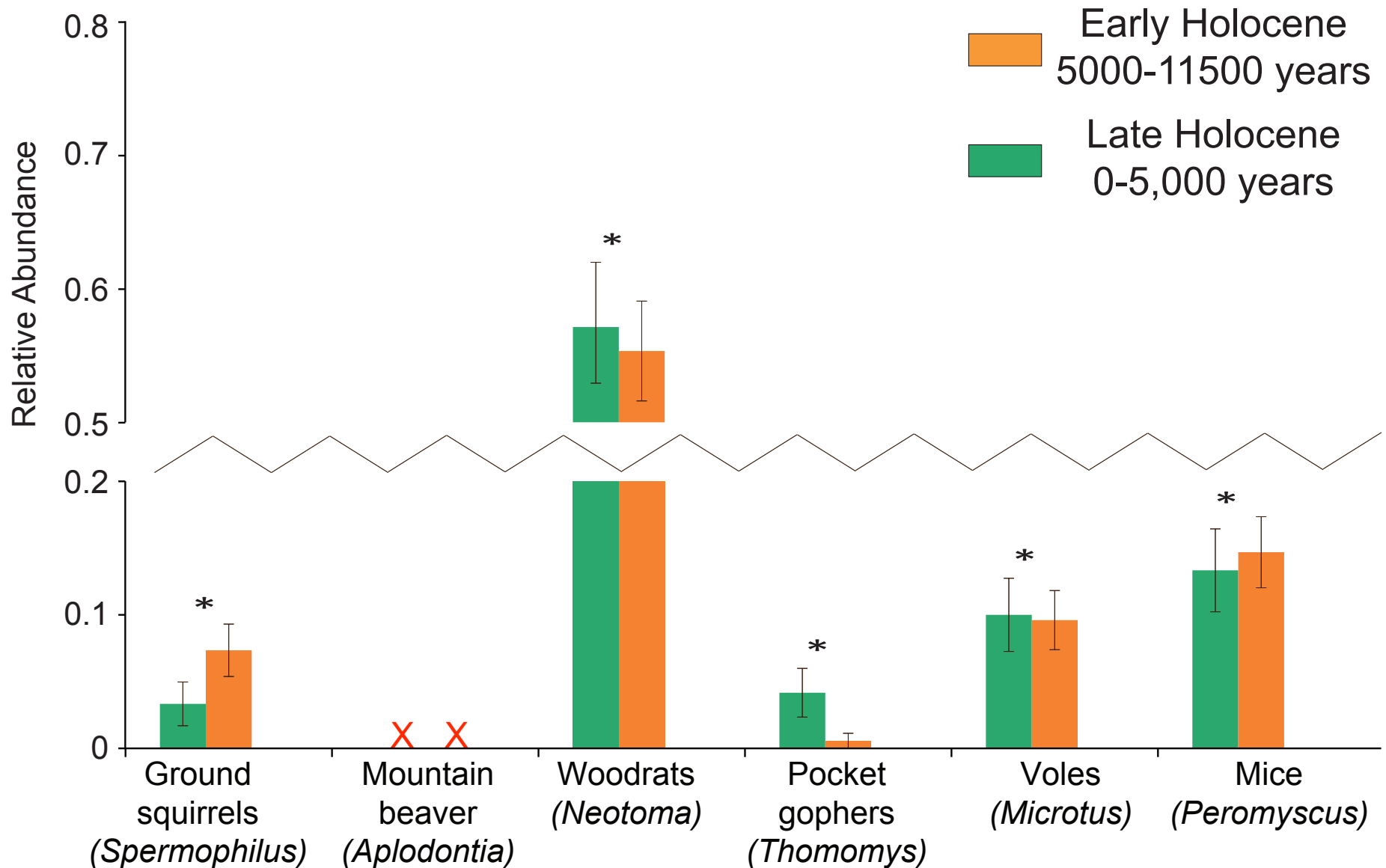
Small Mammals



Relative Abundance Change



Relative Abundance Change



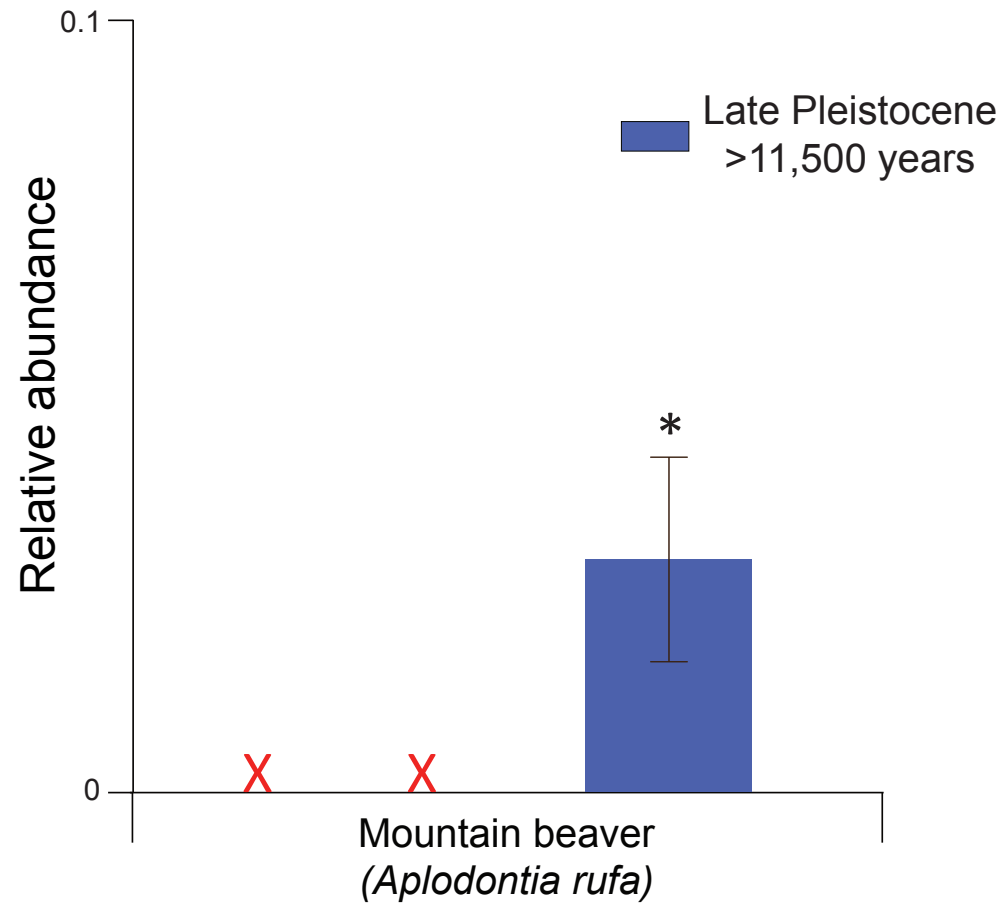
Range Contraction



Mountain beaver
(*Aplodontia rufa*)



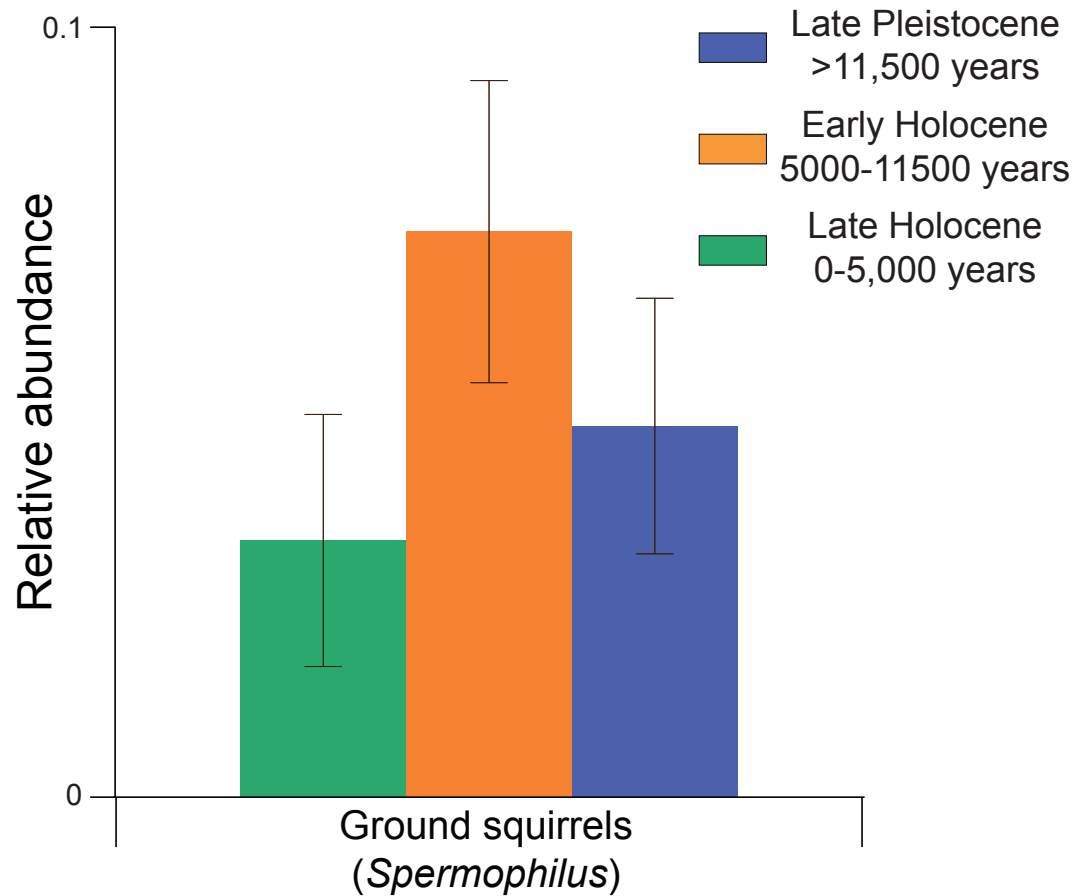
Range Contraction



Population Size Change

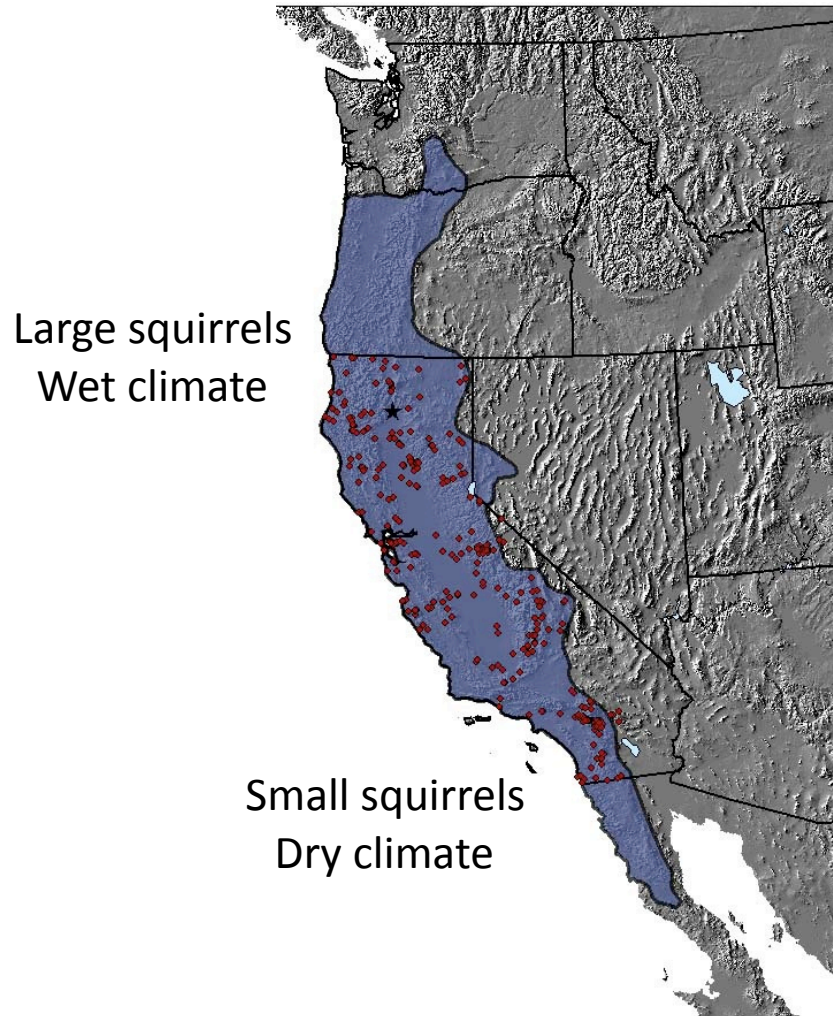


California ground squirrel
(*Spermophilus beecheyi*)



Morphologic Change

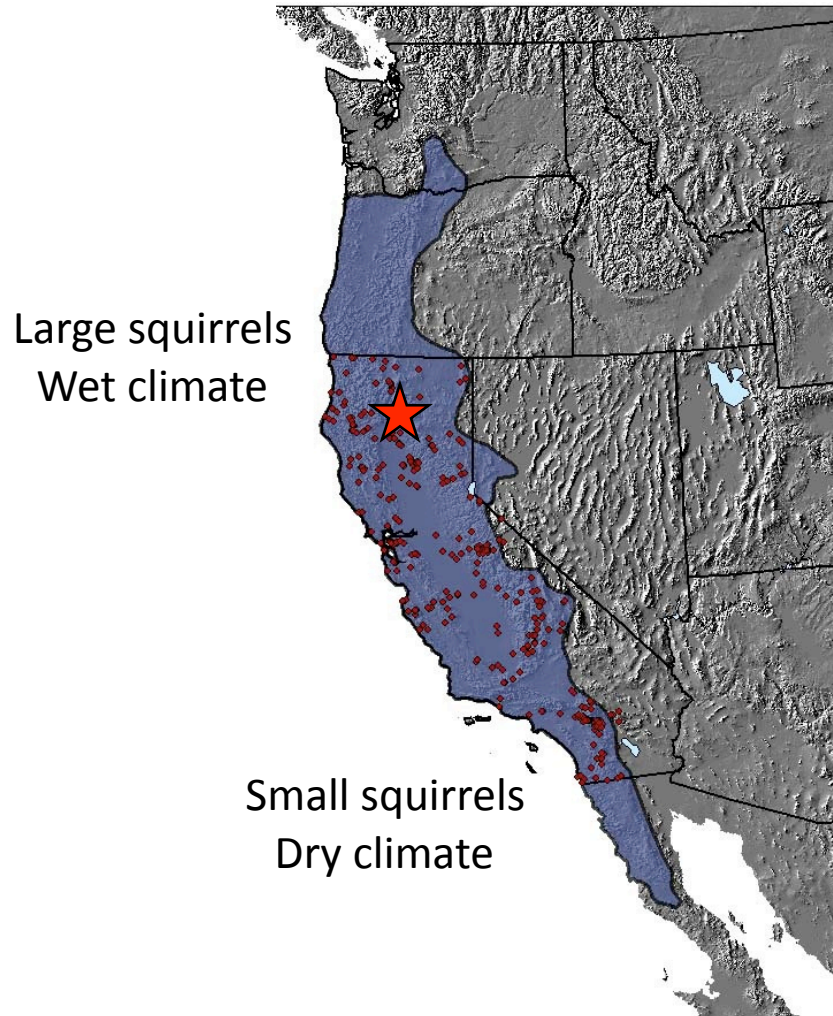
Body Size Across Space



Modified from Blois et al. 2008

Morphologic Change

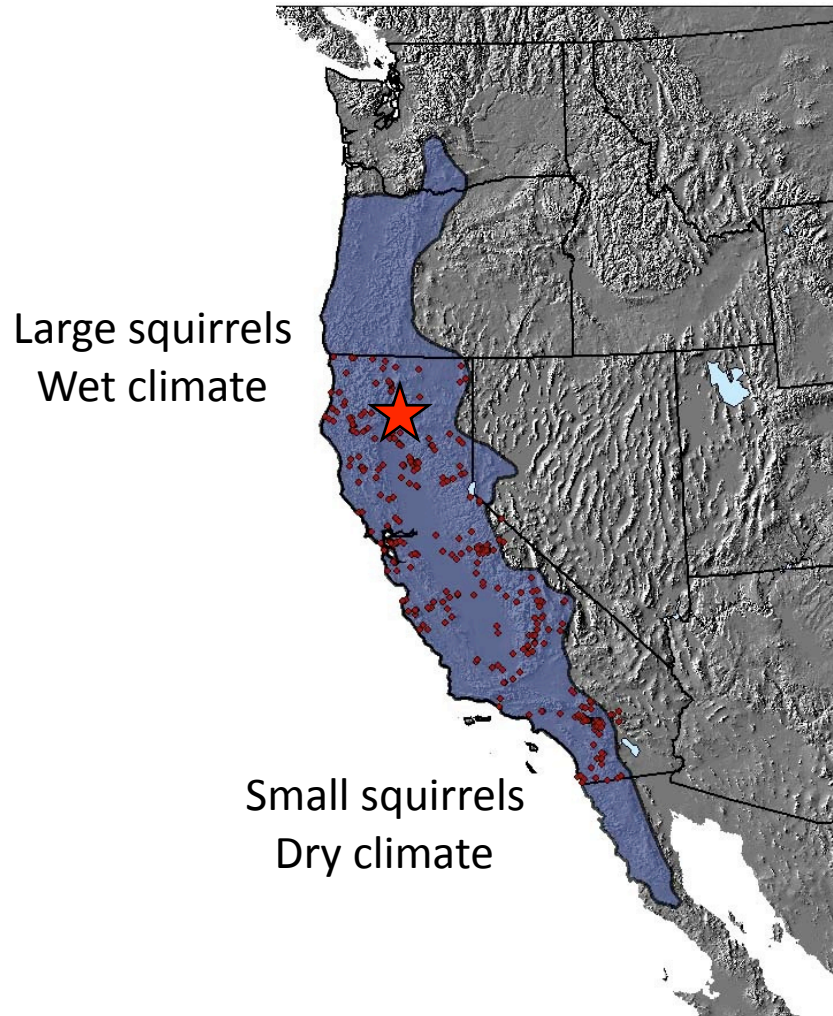
Body Size Across Space



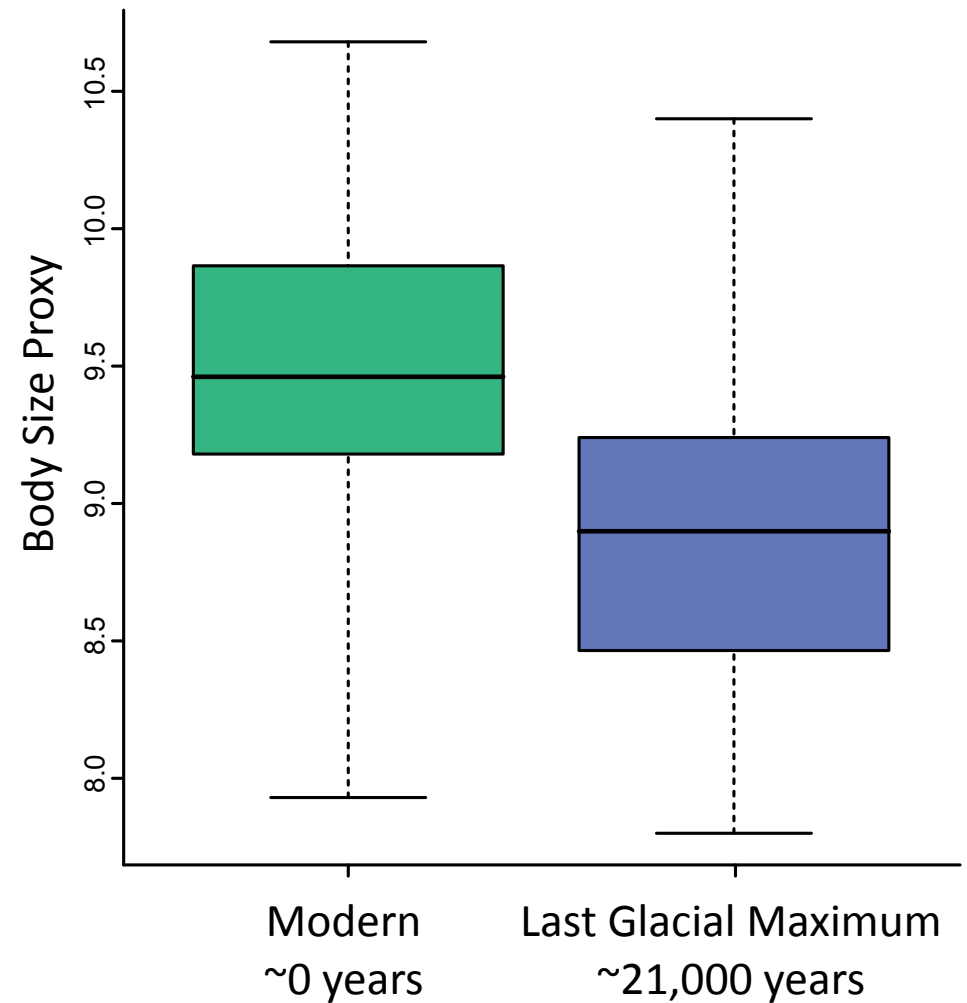
Modified from Blois et al. 2008

Morphologic Change

Body Size Across Space



Body Size Over Time

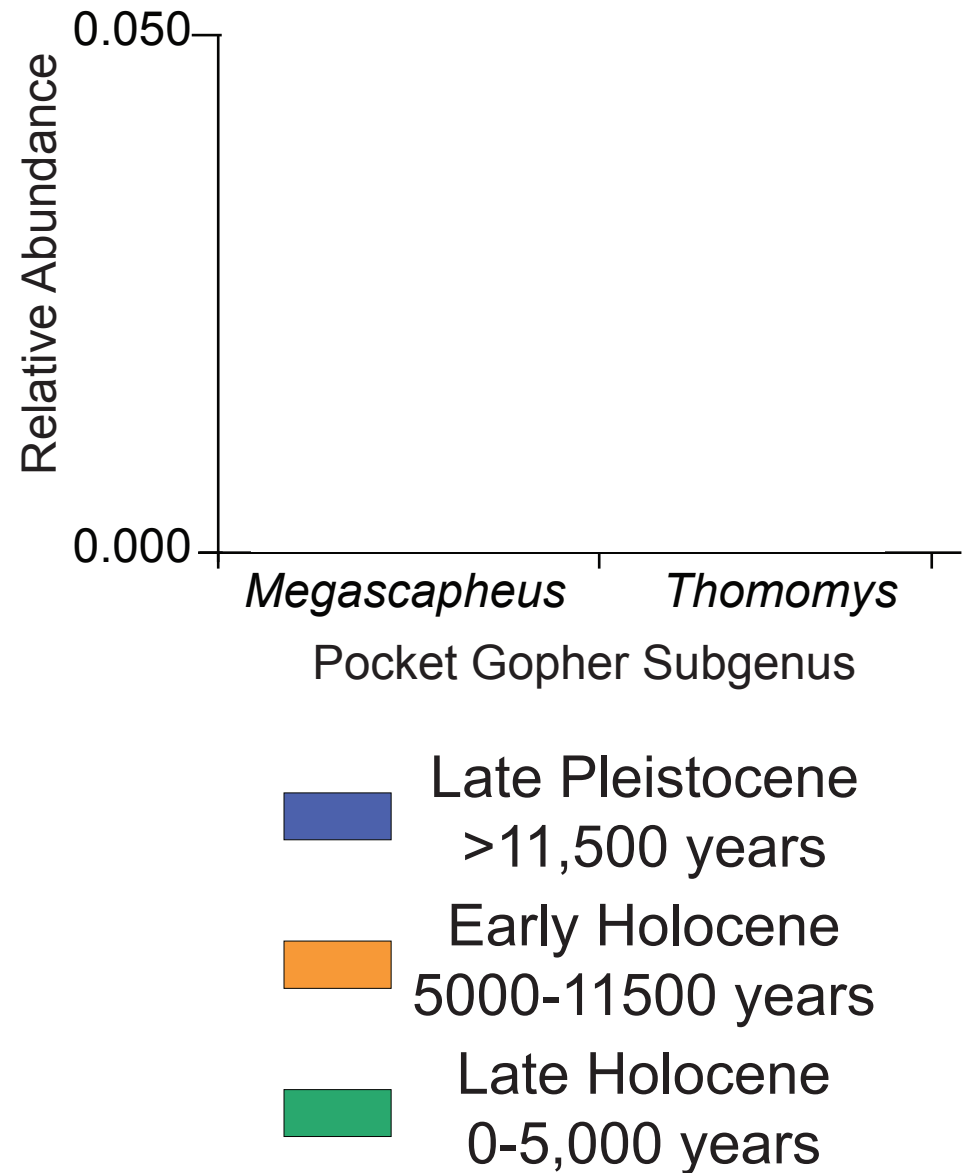


Modified from Blois et al. 2008

Species replacement



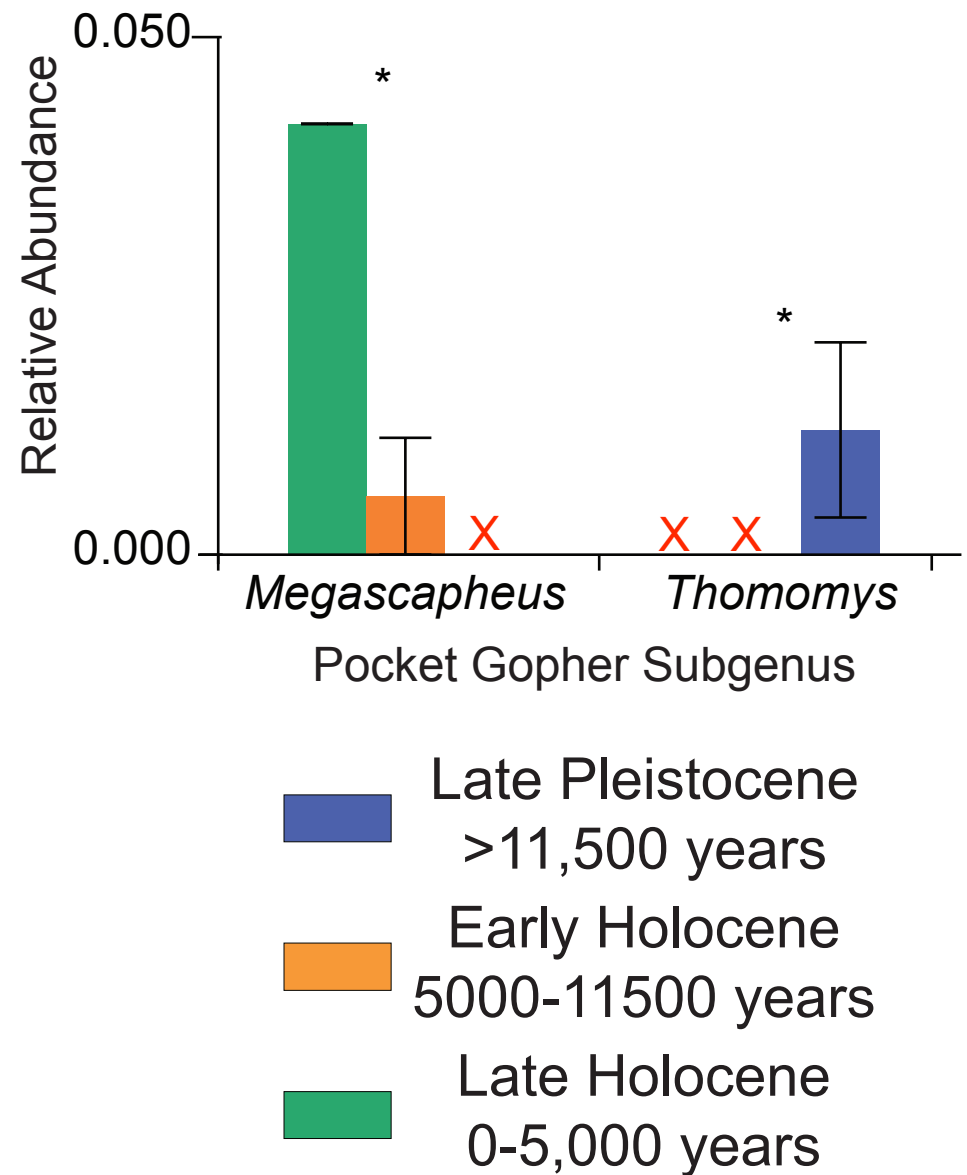
Pocket gophers
(*Thomomys* sp.)



Species replacement



Pocket gophers
(*Thomomys* sp.)



Biotic Responses to Climate Change

Abundance
Change

Small mammal
community

Biotic Responses to Climate Change

Abundance
Change

Small mammal
community

Range Shift

Mountain beavers

Biotic Responses to Climate Change

Abundance
Change

Small mammal
community

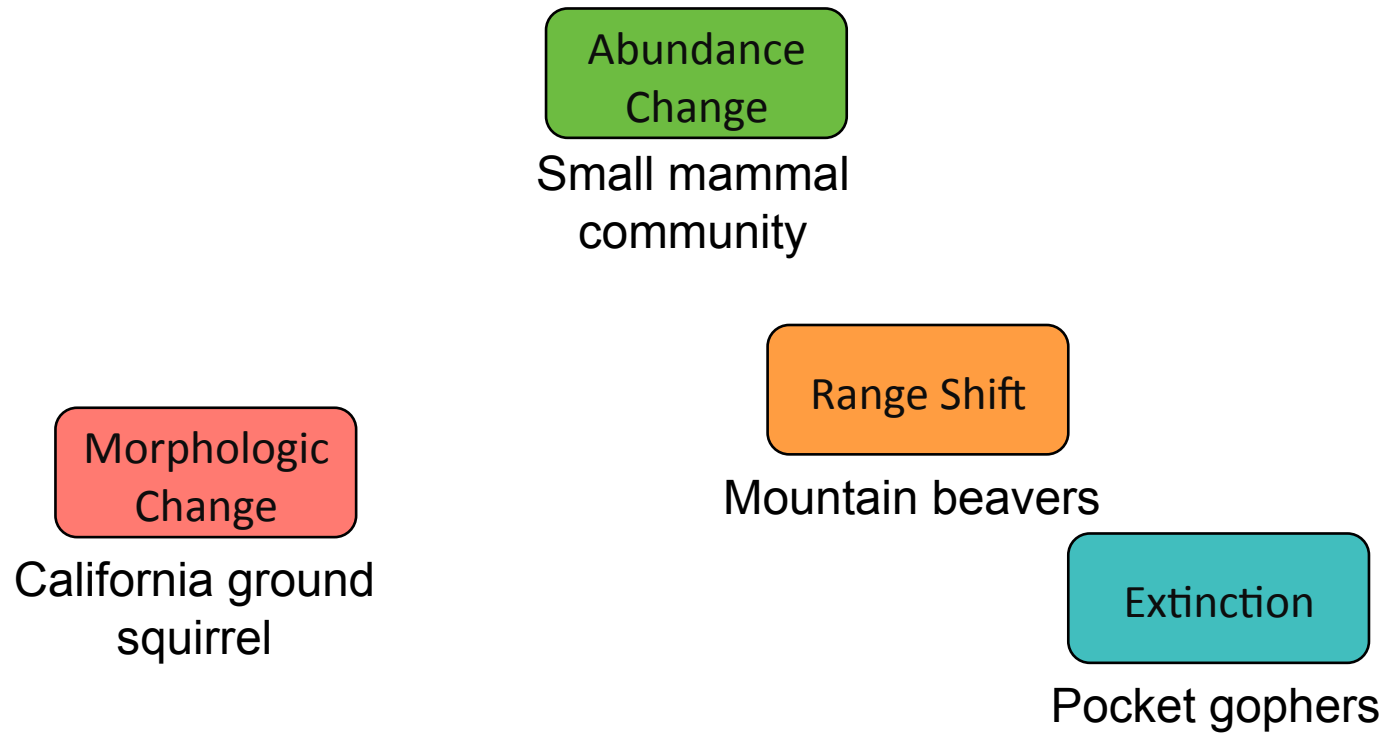
Morphologic
Change

California ground
squirrel

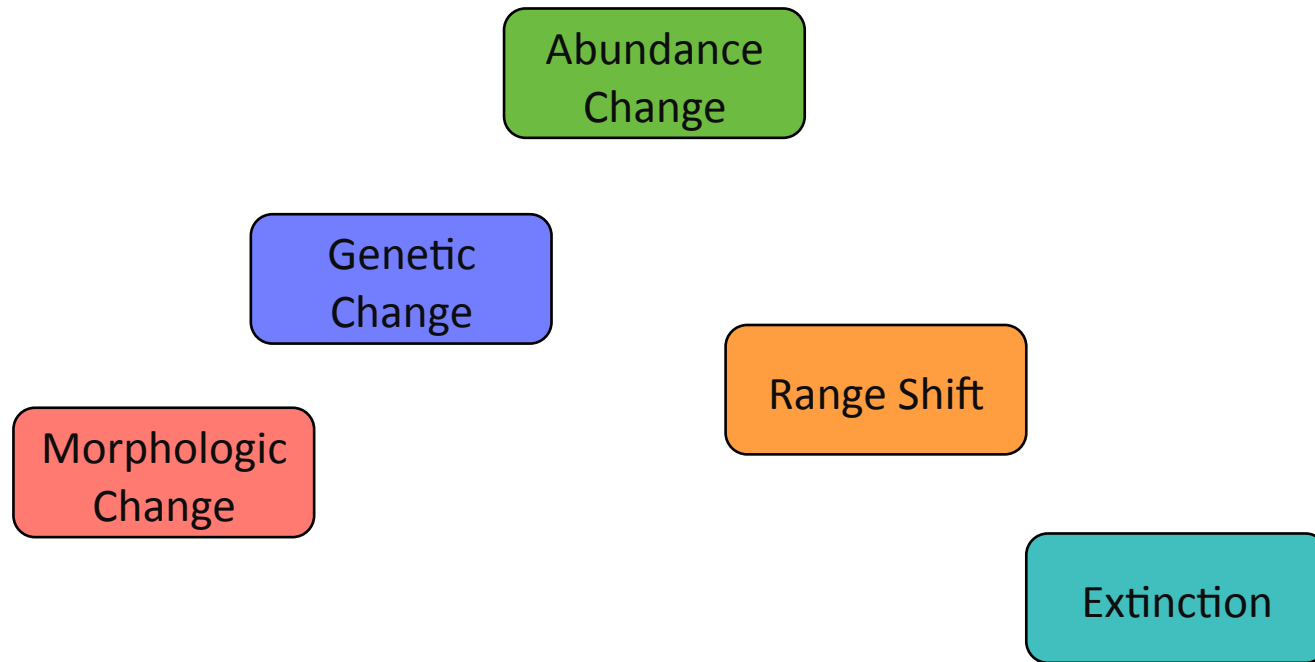
Range Shift

Mountain beavers

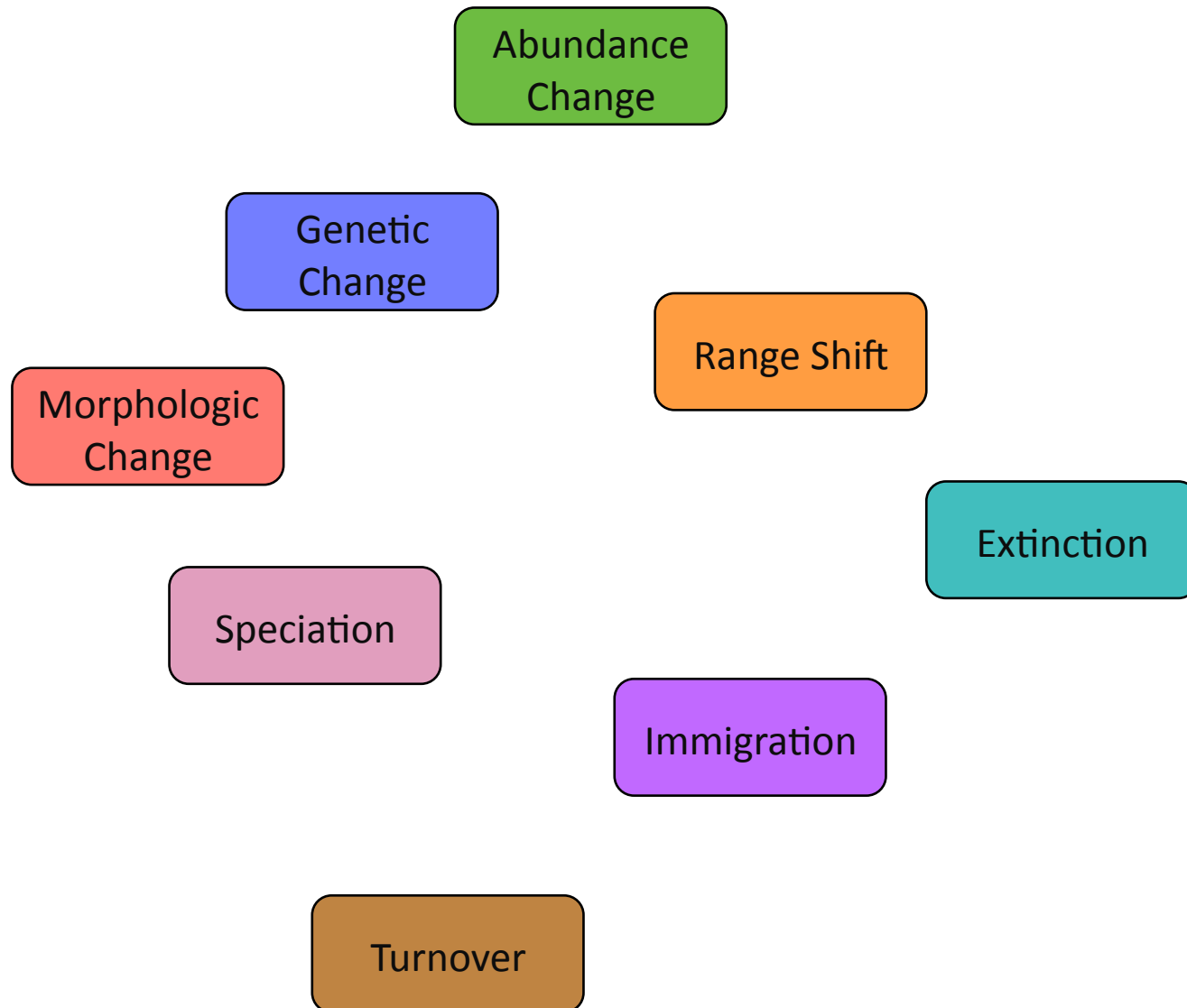
Biotic Responses to Climate Change



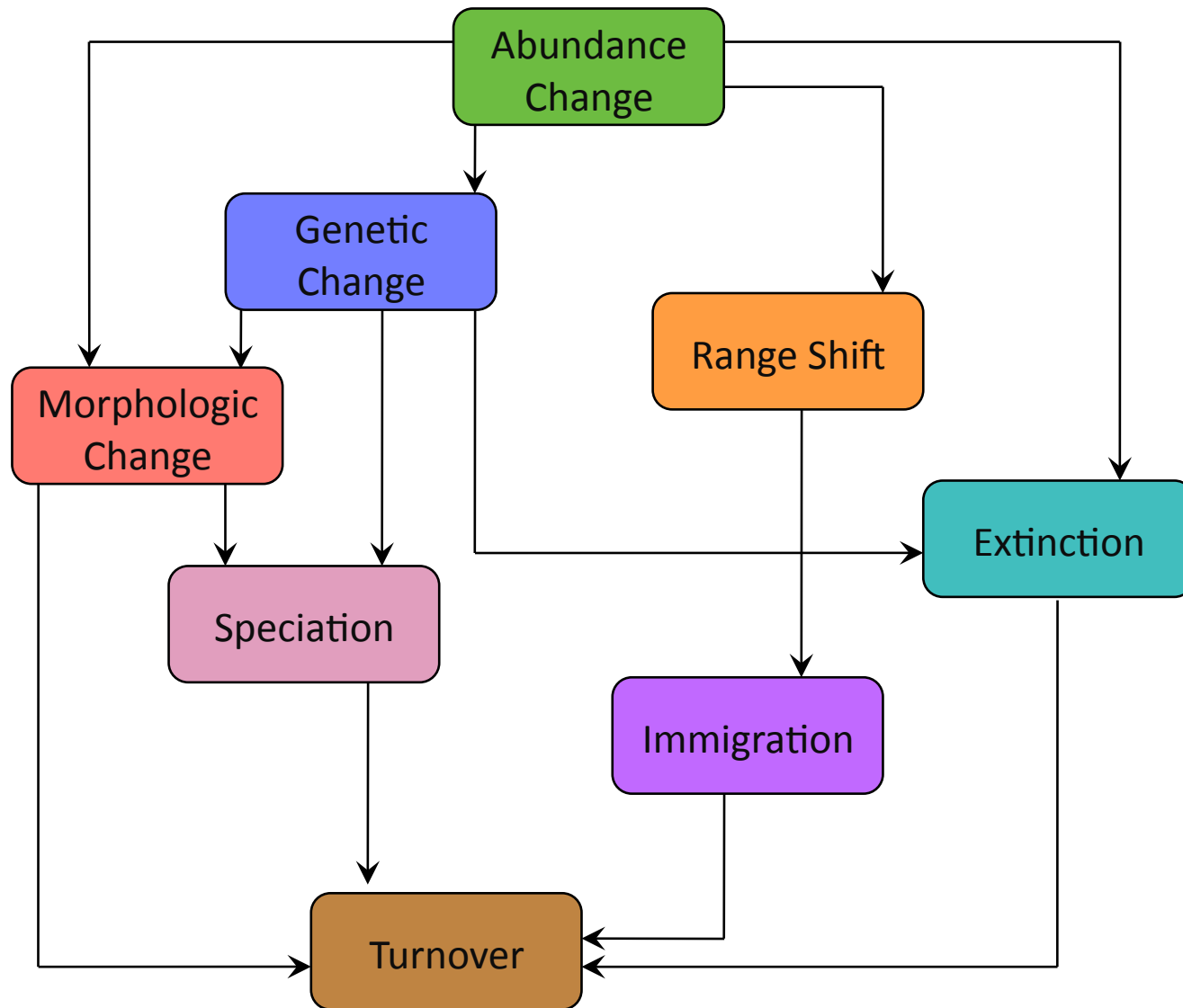
Biotic Responses to Climate Change



Biotic Responses to Climate Change



Biotic Responses to Climate Change





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